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Armour School

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Abstract

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ARMY TECHNICAL INTELLIGENCE REVIEW

RESTD

No 94   July 1969

RESTRICTED

ARMY TECHNICAL INTELLIGENCE REVIEW No. 94

JULY 1969

INDEX

FOREWORD

I hope that readers will note and be suitably impressed by the use of colour for the first time. There are obviously some items which can be better conveyed by its use and we shall try to use colour in future where it helps.

We are happy to report that our opinion is increasingly sought on a wide variety of matters even if our crystal ball has at times become a little misted over with perspiration.

Staff changes and shortages are making themselves felt, and we must apologise in advance for what is bound to be the late appearance of this issue.

Col Tech Int (A)

1. CZECHOSLOVAKIAN ARMOURED PERSONNEL CARRIERS

It is worth remembering that Czechoslovakian industry is one of the most sophisticated of the satellite countries. As a result of this they produce a number of their own military vehicles.

There are three main types of APC in use today, most of which resemble Soviet designs but with certain differences. The earlier model is the OT-62 (TOPAS) which is similar to the BTR-50 and the later ones are the OT-64 (SKOT) and the OT-64B.

OT-62 (TOPAS)

OT-62 (TOPAS)

The OT-62 first appeared in 1964. It is based on the Soviet BTR-50PK which it closely resembles. For recognition purposes the main difference is its two protruding bays instead of one in its Soviet counterpart.

Characteristics

Capacity	2 + 18
Weight	15 tons
Armament	7.62-mm MG and 82-mm RCL
Max Road Speed	36 mph (58 kph)
Length	22 ft 8 in (6.91 m)

OT-64 (SKOT)

OT-64 (SKOT)

The OT-64 also first appeared in 1964. It is of Czech design and could be confused with its Soviet counterpart, the BTR-60. For easy recognition note the layout of the wheels.

Characteristics

Capacity	2 + 18	
Weight	12.5 tons	
Armament	crew weapons only	
Max Road Speed	60 mph	(95 kph)
Length	25 ft 2 in	(7.67 m)

OT-64 (SKOT)

OT-64 B

OT-64B

The OT-64B first appeared in 1966. It is the same vehicle as the OT-64 except that it has now been fitted with a turret incorporating both a heavy and a co-axial light machine gun.

Armament -	Main	14.5-mm	KPVT
	Co-axial	7.62-mm	PKT

OT-64B

2. TWO NEW FRENCH INFANTRY ANTI-TANK WEAPONS

In 1964, the French DAT (Director Technique Des Armaments) asked a private firm STRIM (Societe Technique Des Recherches Industrielles et Mecanique) and a state organisation APX (L'Atelierde Construction de Puteaux), to undertake a design study on a cheap, portable, robust, easily maintained infantry weapon that could knock out main battle tanks at ranges up to 500 metres with a high degree of accuracy but without sighting adjustment over this span.

The results were two different designs : the STRIM Rocket Launcher and the Rocket-Assisted Recoilless Gun APX.

ACL-STRIM
(French Army Designation: 89-mm LRAC Model F1)

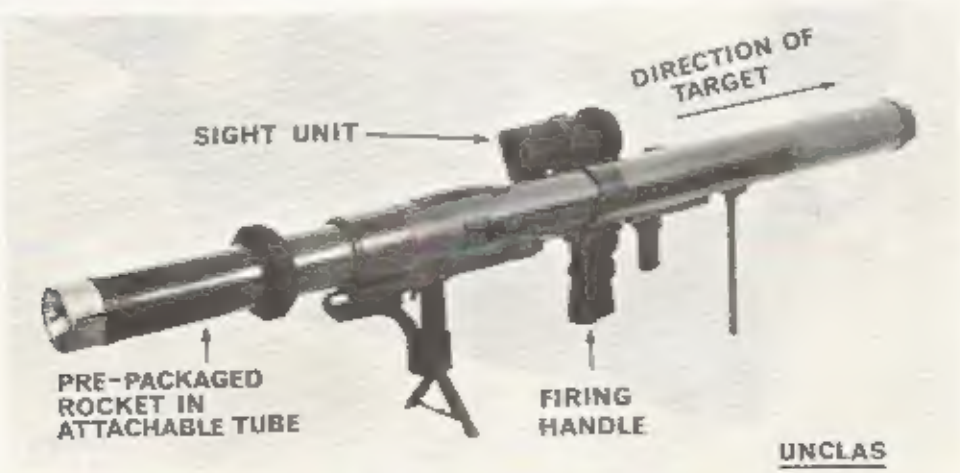
STRIM is a conventional-looking tube-launched rocket with some very interesting innovations.

The weight has been substantially reduced through the use of laminated fibreglass in the tube, and light alloys and plastics in the projectile. The tube is considered to have a life of 100 rounds and to be more damage resistant than metal.

The system has an easy load capability that is half-way between the hand loaded rocket of the old 3.5 inch rocket launcher and the pre-packaged, throw-away, M72 or Miniman. The rocket comes in a tube extension which is easily assembled to the main tube by a bayonet type connection and which also when properly connected, completes the electric firing circuit. This technique reduces the length of the launcher when it is being carried unloaded.

Accuracy with a single point of aim is achieved by a combination of factors, but is primarily due to the use of a high combustion rate brush-type propellant which gives a relatively high muzzle velocity. The muzzle velocity is very consistent; varying, for example, only 6 m/s over a temperature range of -31°C to +51°C. (-24°F to +124°F). Stability is achieved by fins which are extended by the initial spin of the projectile.

This weapon system which is now entering service in the French Army, appears to have satisfied all design requirements except the 500 metre range. Its effective range is 400 metres.

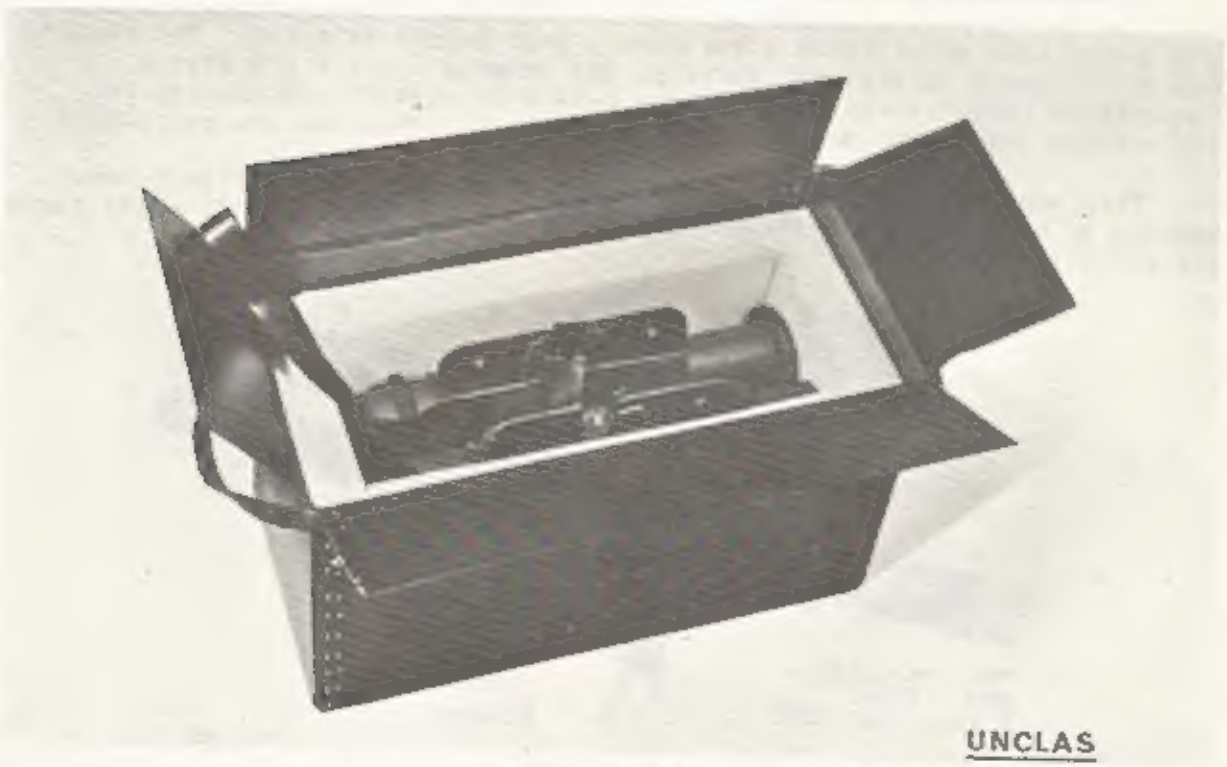


WEAPON EQUIPPED WITH SHIELDED SIGHTING TELESCOPE AND CONTAINER FITTED READY FOR FIRING

WEAPON-CONTAINER ASSEMBLY AND SHIELDED SIGHTING TELESCOPE DURING TRANSPORT

ENDS ARE REMOVED FROM AMMUNITION CASING AFTER IT IS ATTACHED TO THE BREECH END OF THE LAUNCHER, SIGHT UNIT IS CARRIED IN THE BREECH END OF THE TUBE WHERE IT SERVES AS A DIRT AND RAIN PLUG.

ACL-STRIM ROCKET IN FLIGHT



ACL STRIM

EUROPEAN-CLIMATE TRANSPORT - BOX FOR 4 ROCKETS PACKED IN 2 LASHINGS OF TWO, WITH CARRYING STRAP

Characteristics - STRIM

Weapon

Calibre	88.9 mm	(3.5 in)
Length - during transport	1.168 m	(3.83 ft)
Length - in firing position	1.600 m	(5.26 ft)
Weight - during transport (with 0.5 kg sighting telescope)	4.5 kg	(9.92 lb)
Weight - in firing position (without container plugs)	7.3 kg	(16.1 lb)

Ammunition

Diameter	88.9 mm	(3.5 in)
Diameter of shaped charge	80 mm	(3.16 in)
Total length	0.600 m	(1.98 ft)
Container length	0.626 m	(2.06 ft)
Total weight - without container	2.2 kg	(4.85 lb)
Total weight - with container	3.2 kg	(7.06 lb)
Weight of the propellant powder charge	0.3 kg	(0.66 lb)
Weight of explosive of the shaped charge	0.565 kg	(1.25 lb)

Ballistics

Muzzle velocity	(at +20°C (+68°F)	291.2 m/s	(957 fps)
	(at +51°,5C (+124°F)	293.2 m/s	(965 fps)
	(at -31°,5C (-24°F)	287.2 m/s	(945 fps)
Combat range		360 m	(394 yd)
Effective range		400 m	(438 yd)
Time of flight at 400 m range		1.56 s	

Effectiveness of the Shaped Charge

Thickness if armour perforated at 0° incidence	400 mm	(15.7 in)
NATO Targets 80-90% perforated		
- Single target, heavy tank	120 mm/60° (4.72 in/60°)	
- Dual target, heavy tank	40 + 110mm/60° (1.51 in + 4.33/60°)	
Limiting angle of incidence	74-75°	

80 mm ACL/APX

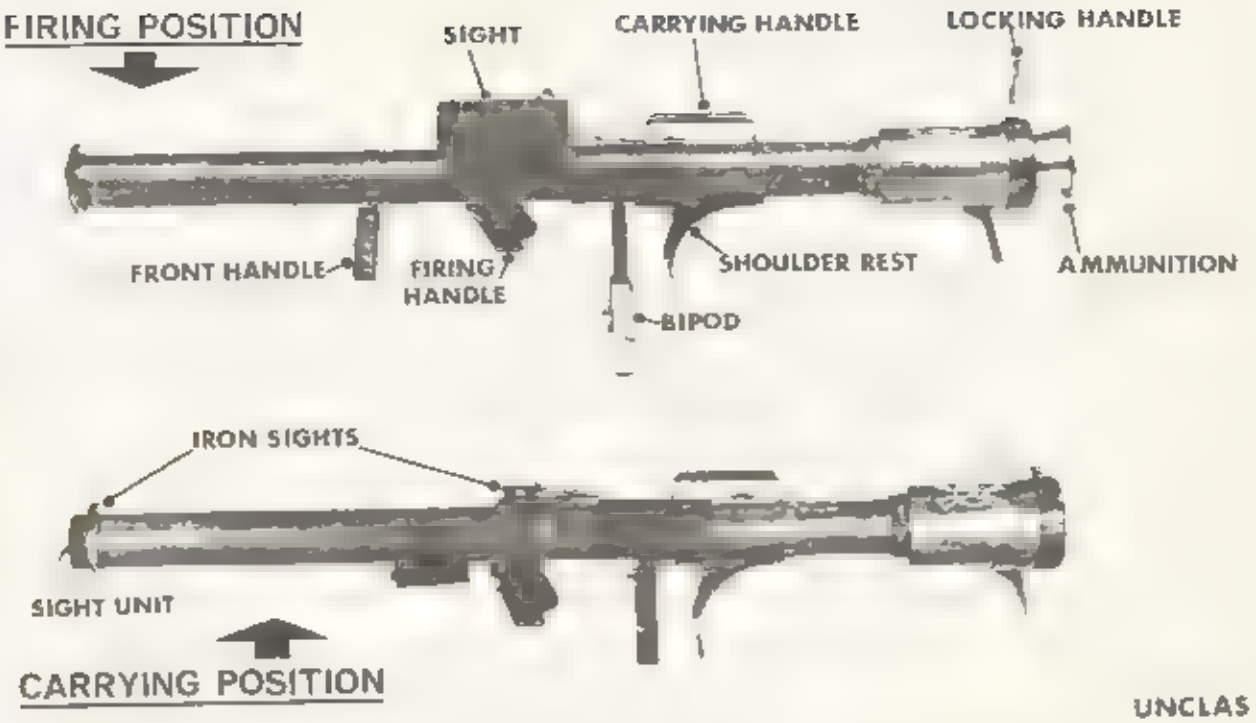
The APX solution resulted in a lightweight high strength steel recoilless rifle firing a well designed compact rocket-assisted round. Though the design "single point of aim" range is the required 500 metres, the system is in fact very effective up to 800 metres.

The warhead contains the majority of the innovations. The high penetration of this relatively small HEAT charge is a result of very good design and manufacturing techniques.

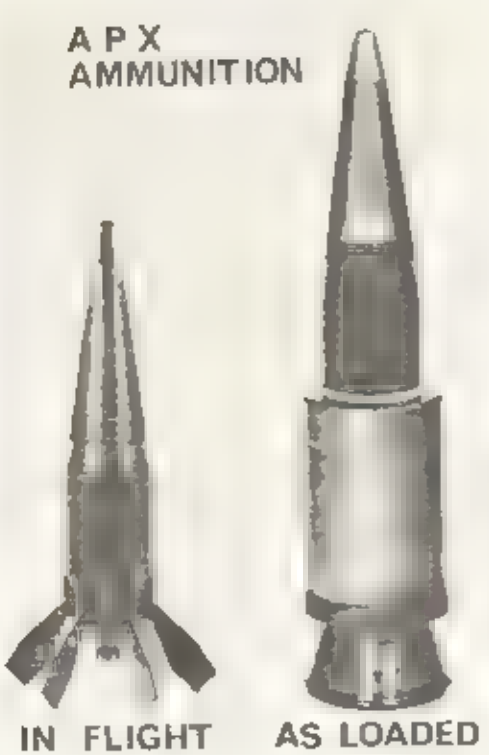
The container of the initial propulsive charge which launches the projectile at a muzzle velocity of 400 m/s (1312 fps) also forms the venturi nozzle required to achieve recoilless operation. But perhaps the most interesting feature is the rocket assistance which operates about 10 metres after launch and accelerates the projectile up to 535 m/s (1760 fps) at 200 m range. This is not the world's first rocket-assisted round used in the anti-tank role (that was the Soviet PG-7, which became operational in 1962), but APX applied the rocket motor to the usually wasted stand-off volume in the nose of the warhead. The resultant peripheral nozzle is not as efficient as a proper nozzle but this is more than off-set by the overall compactness of the ammunition. A channel is left in the rocket motor so that the HEAT jet is not degraded by having to pass through any residual propellant fuel.

APX is at present in the prototype stage.

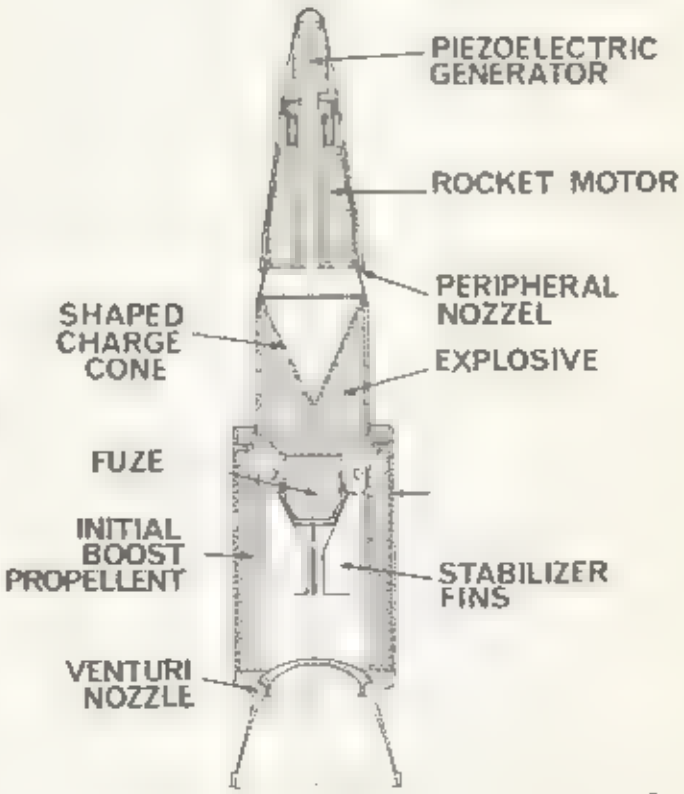
ACL/APX



UNCLAS



UNCLAS



UNCLAS

Characteristics - APX

Ammunition

- Calibre 80 mm (3.16 in)
- Overall length 530 mm (1.74 ft)
- Total weight. 3.250 kg (7.16 lb)
- Weight of the projectile 1.850 kg (4.08 lb)
- Weight of the explosive of the shaped charge: 0.550 kg (1.21 lb)

Weapon

- Overall length 1.400 mm (4 60 ft)
- Weight 7.550 kg (16.88 lb)
- Weight of the weapon (with telescope and ammunition ready for firing) 11.400 kg (25.15 lb)

Ballistics

- Muzzle velocity 390 m/s (1280 fps)
- Maximum velocity 535 m/s (1760 fps) at 200 m (220 yds) of the trajectory
- Effective combat range 530 m (580 yd)
- Time of flight for 530 m 1.18 s

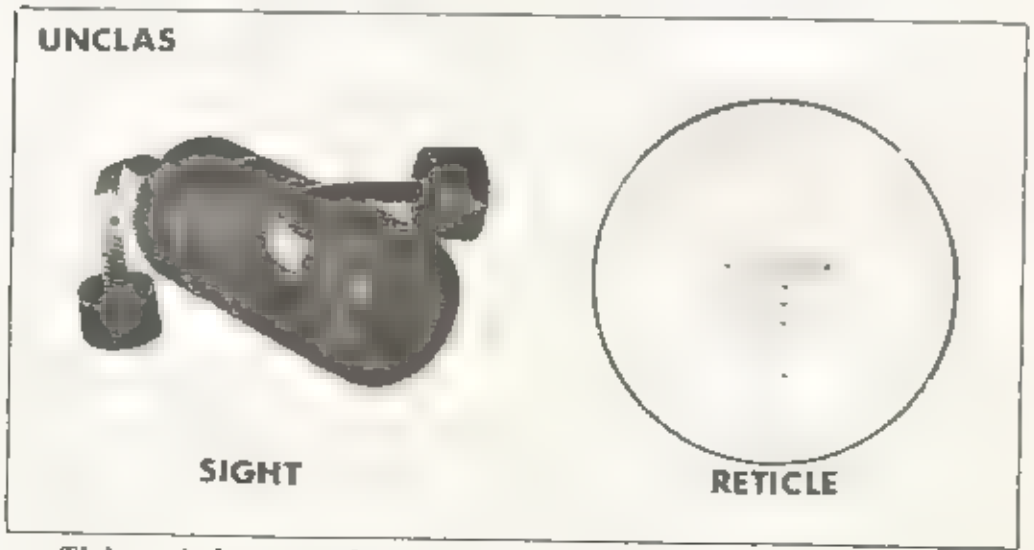
Effectiveness of Shaped Charge

NATO Targets

Single target heavy tank 120 mm (4.72 in)/65°

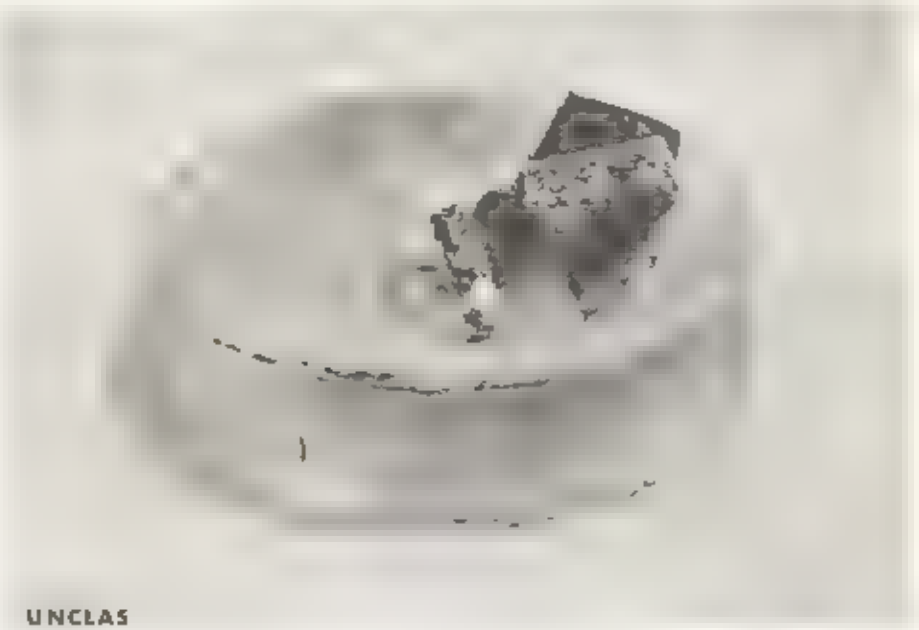
Double target heavy tank 40 mm (1.57 in) + 110 mm (4.33 in)/65

Expected performance at 0° incidence 400 mm (15.7 in)



This sight may be used on both the STRIM and APX

3. VIET CONG HOME-MADE SHAPED CHARGE



UNCLAS

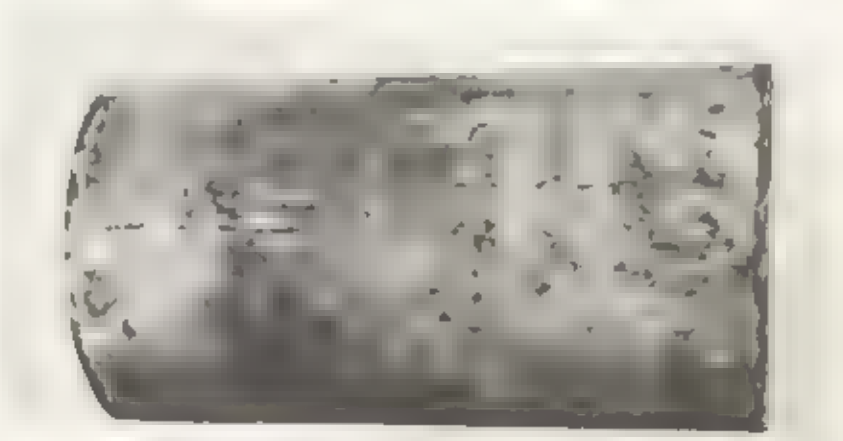
Top View of Shaped Charge Mine

This mine consists of a can with one end open and the other closed by a shaped charge mine which has a wooden cover. The shaped charge is similar to the MDH-8 Viet Cong Directional Mine although no fragments are in this mine. It is thought that the can would be filled with fragments of rock nails, broken glass or other objects to make it into a fragmentation type mine.

Characteristics		Metric measurement
Height of can	20 in	508 mm
Diameter of can	10.25 in	261 mm
Diameter of mine	10 in	254 mm
Thickness of mine	2 5 in	63 mm
Diameter of wooden cover	10 in	254 mm
Thickness of wooden cover	.75 in	19 mm
Total weight	15.5 lb	394 mm
Weight of mine	8 5 lb	216 mm
Can material	Galvanised sheet metal	
Explosive	Nitrate black powder	
Method of detonation	Electrical	

VIET CONG HOMEMADE SHAPED CHARGE

Bottom View Of Shaped Charge Mine



Side Veiw Of Can

Wooden Cover

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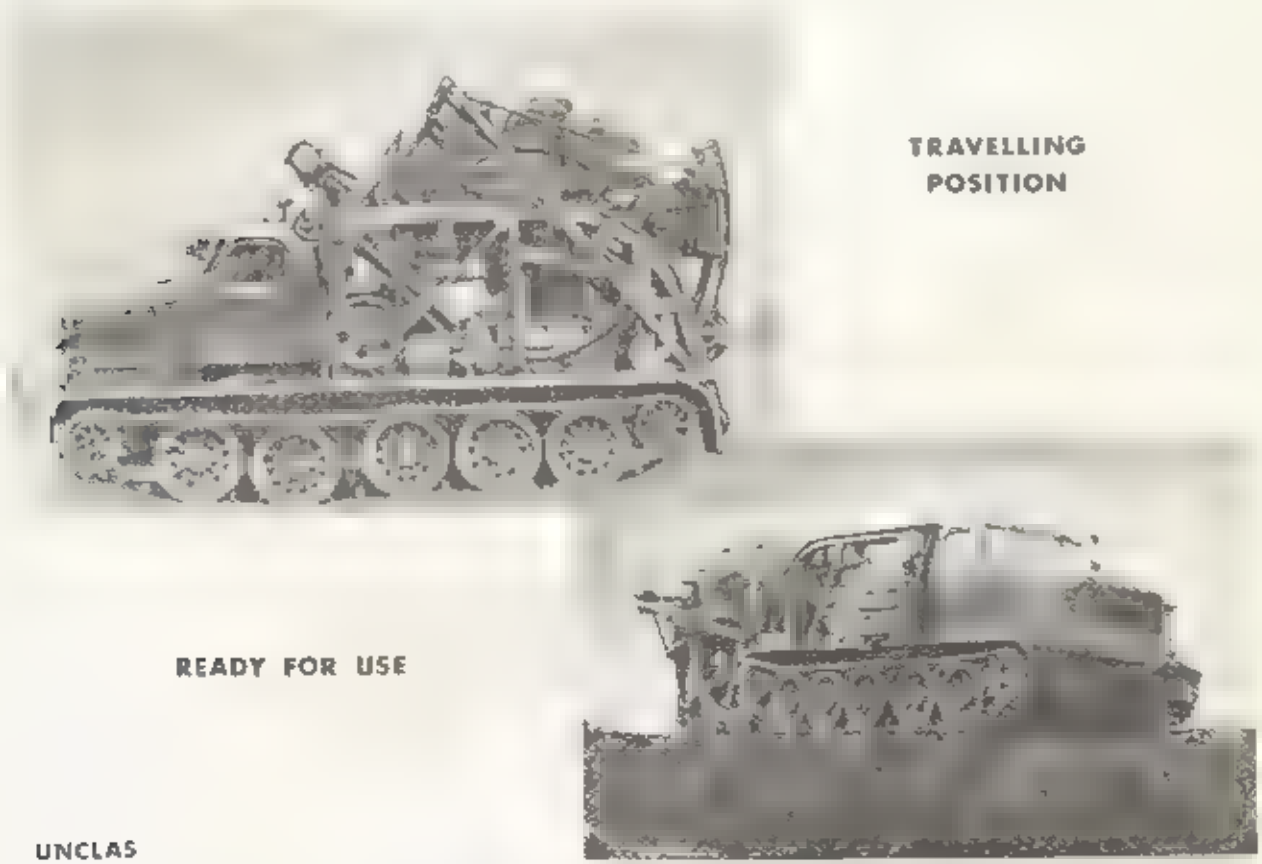
SOVIET MILITARY EXCAVATING EQUIPMENT

UNCLAS

The Soviets place great emphasis on the importance of speed in digging shelters for any future wars. Digging of shelters will be required in all types of terrain and in any soil condition and they must be able to give protection against NBC warfare. These requirements have lead to the development of excavating machines with large outputs to replace previously used manpower. The Soviet forces carry out extensive training in the construction of shelters of all types and have from experience modified both construction equipment and design of shelters.

The excavation tasks are undertaken by a variety of machines both commercial and military but in this article only the specialised machines produced solely for military purposes are covered

BTM TRENCHER



TRAVELLING POSITION

READY FOR USE

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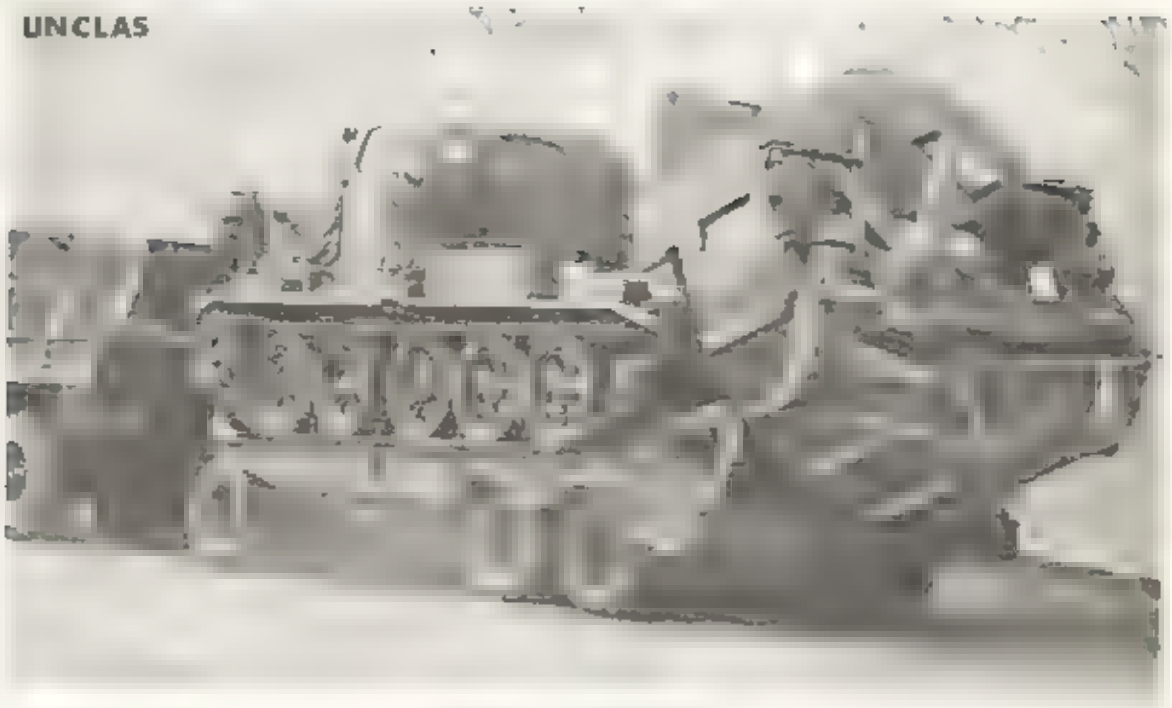
This trencher is mounted on the standard AT-T chassis. It has a ten bucket rotary type digger which pivots about an axis to the rear of the chassis when operating. A modified version of the BTM has also been produced designated BTM-IMG

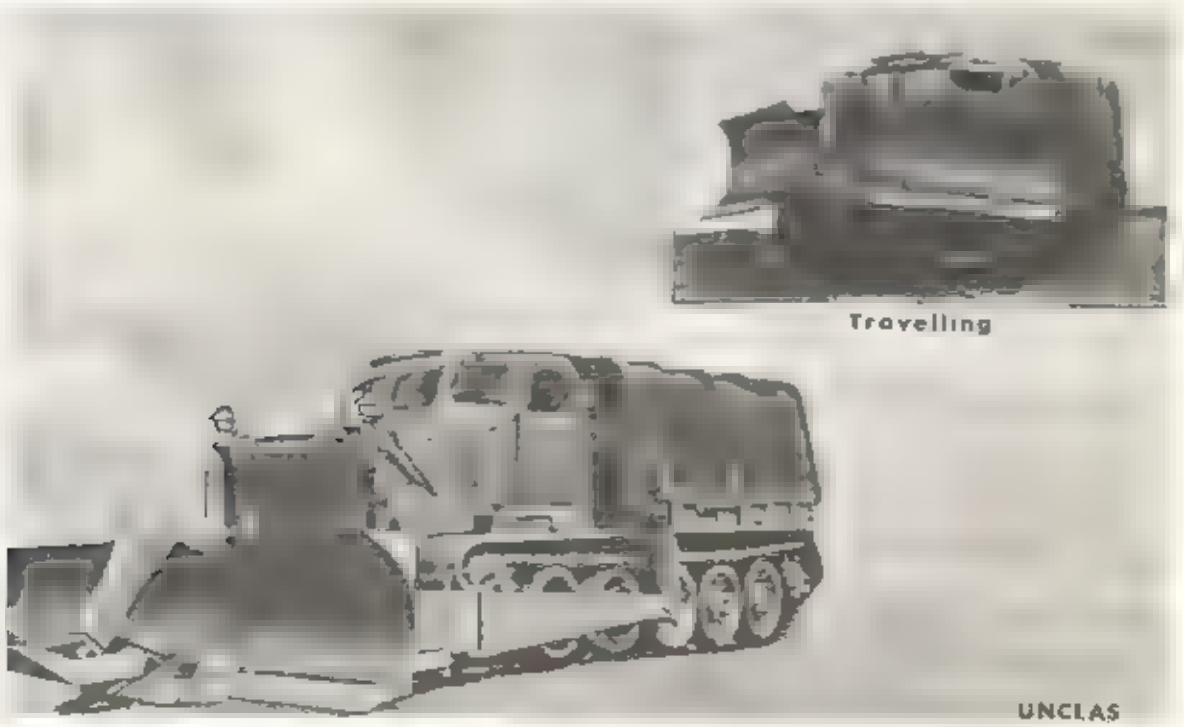
MDK-2 TRENCHER



MDK-2 TRENCHER

The MDK-2 is a more recently produced trencher mounted on the same AT-T chassis as the BTM. When not in operation the rotary digger lies flat behind the cab and is hinged to a vertical position for digging.

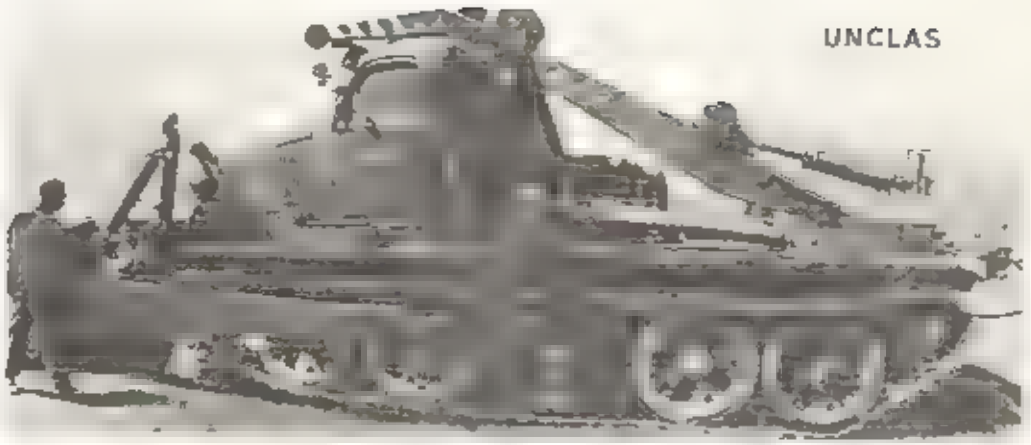
BAT COMBAT TRENCHER



BAT Combat Tractor

The BAT is an AT T tractor fitted with a blade which can be angled. It is cable operated.

BAT-M COMBAT TRENCHER



BAT-M Combat Tractor

This is a modified BAT redesignated BAT-M. The modifications include the replacing of the mechanically operated bulldozer blade with a hydraulically operated system and adding a hydraulically operated crane. The BAT and BAT-M are widely used in the armies of the Warsaw Pact countries.

BTU-TANKDOZER

BTU Tankdozer

A certain percentage of the tanks in armoured units are equipped with hydraulically operated dozer blades which are designated BTU. These blades are connected to a hydraulic high pressure system in the tank and are operated by the tank driver.

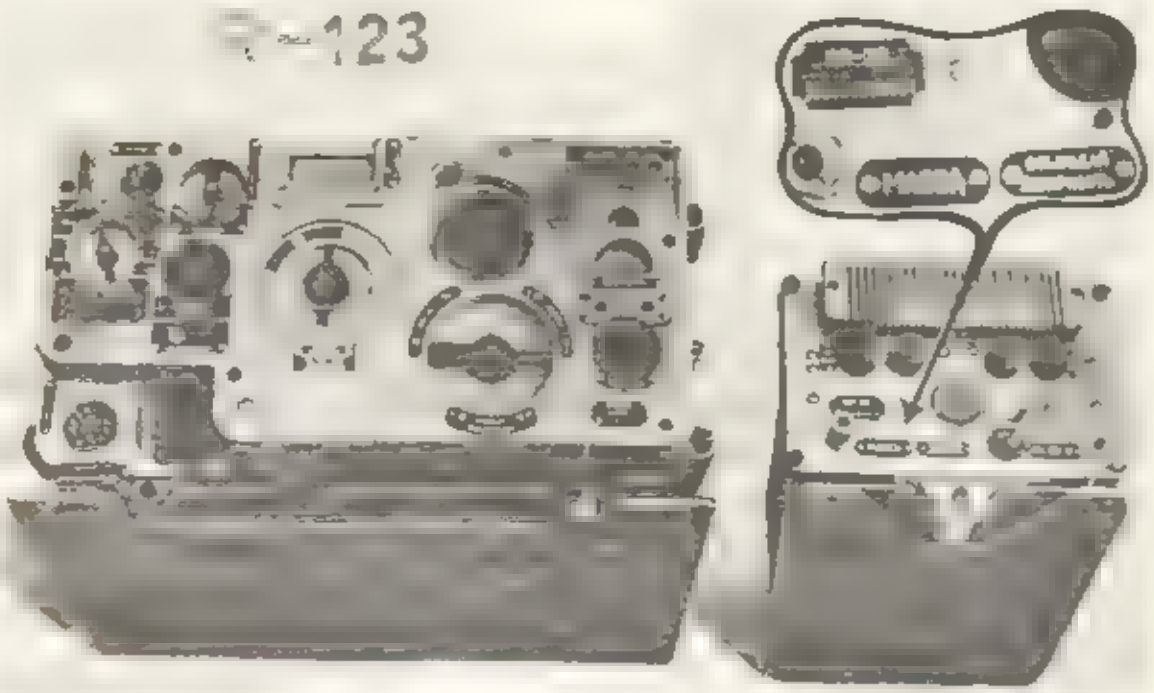
FUTURE EQUIPMENT

An accelerated programme of research and development is being conducted to improve trenching machines. This fact, plus the emphasis placed on specialised training should ensure rapid developments by the Soviets in this field which could lead to machines with an output of at least 5000 cubic metres per hour.

CAPACITIES OF SOVIET MILITARY EXCAVATING MACHINES

MACHINE	HP	DEPTH OF CUT	WIDTH OF CUT	CAPACITY	REMARKS
BTM	415	5 ft	15 9 ft	At 3 ft deep it will dig 3700 linear ft per hour	Recognized by rotary digger and its distinctive mounting.
BTM-TMG	415	5 ft	2 ft	1200 linear yards per hour in unfrozen soil and 110 linear yards per hour in frozen soil.	4 5 tons heavier than BTM
MDK-2	415	4 ft	Top 13 ft Bottom 11.5 ft	At 5 ft deep and 11 ft wide, it will dig 390 yd per hour.	Recognised by rotary digger and hydraulic dozer blade.
BTU	520		11.1 ft	130 to 260 yd per hour	Blades have been seen on most models of Soviet tanks.
BAT and BAT-M	415	5 ft	15.9 ft	From 150 to 420 yd depending on condition of soil.	BAT - Recognised by five independent road wheels and large idler shoes. BAT-M - Distinctive crane and hydraulic system.

5. NEW SOVIET 'R-123' TANK RADIO-SET



Photographs, of equipment captured from the Soviets in the Ussuri River [illegible] CHICOM propaganda paper "Ta Kung Pao" of 27th March 1969, showed a radio transmitter-receiver taken from a knocked-out tank. As SOVIET propaganda films of the same incident showed only T62 tanks in action, it is reasonable to assume that it came from one of these.

The designation "R-123" is discernible on the transmitter-receiver, while thanks to the kindly inclusion of a "blow-up" by the CHICOM illustrator, both [illegible] are easily readable. The last four figures of this serial number indicate that it was manufactured in January 1967. It is considered reasonable to assume that the transmitter-receiver was manufactured at about the same date.

The heavy finning along the top of the front panel of the Power Supply Unit indicates that it is transistorised. This is a considerable advance over the rotary convertor types previously used with all Soviet tank radio sets.

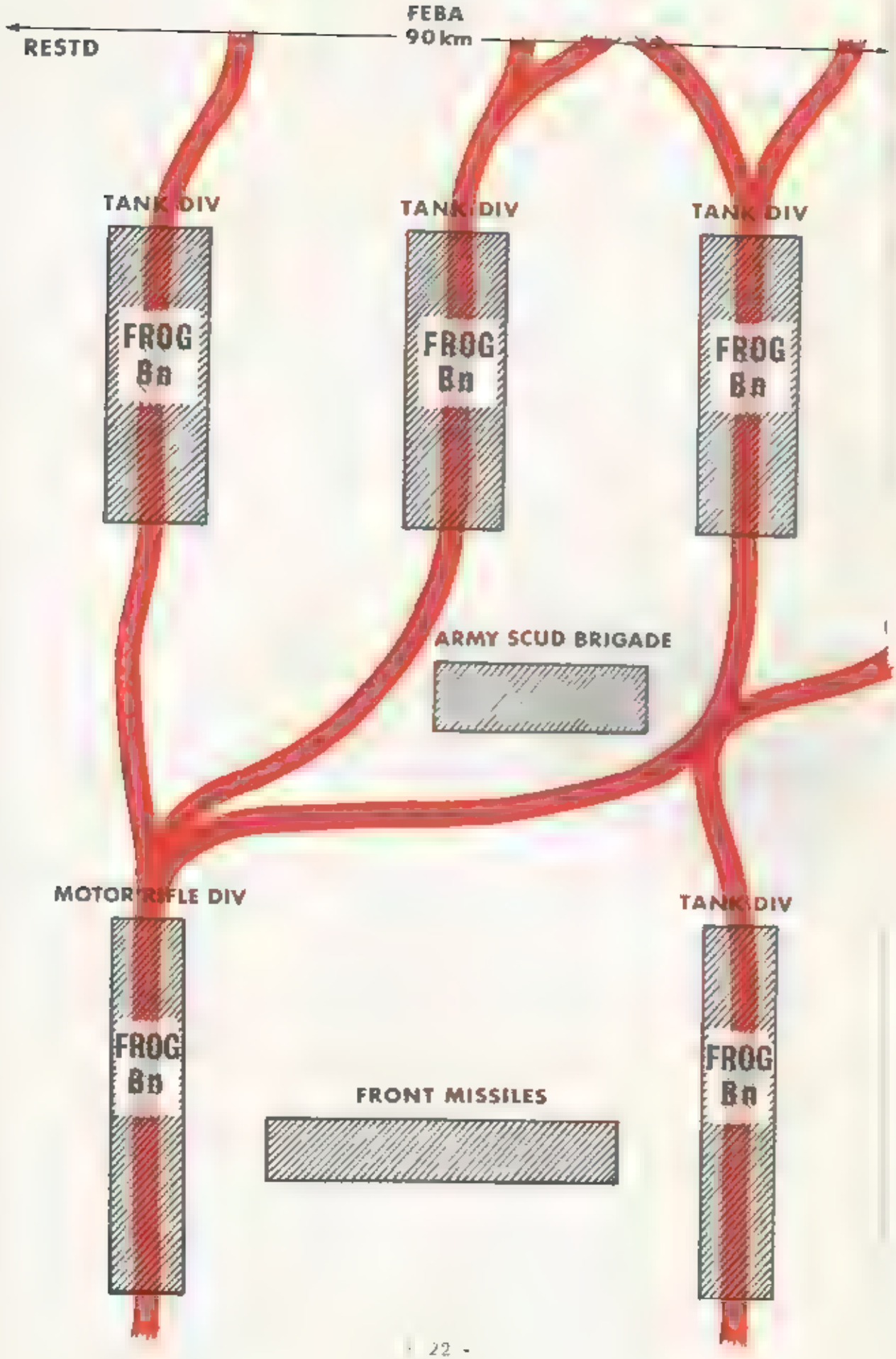
The physical appearance of the R-123 is similar in many respects to that of the R-113, which has for some years been the standard Soviet tank radio. However, as no photographs, or mentions of the R-123 have so far appeared in either Soviet Bloc or East German open publications, unlike the R-113 which was publicised as long ago as 1962, it is considered reasonable to assume that it is of a later design date and is very probably replacing it.

WITH GRATEFUL ACKNOWLEDGMENT TO CHAIRMAN MAO!

6. SOVIET TACTICAL MISSILES

WARNING

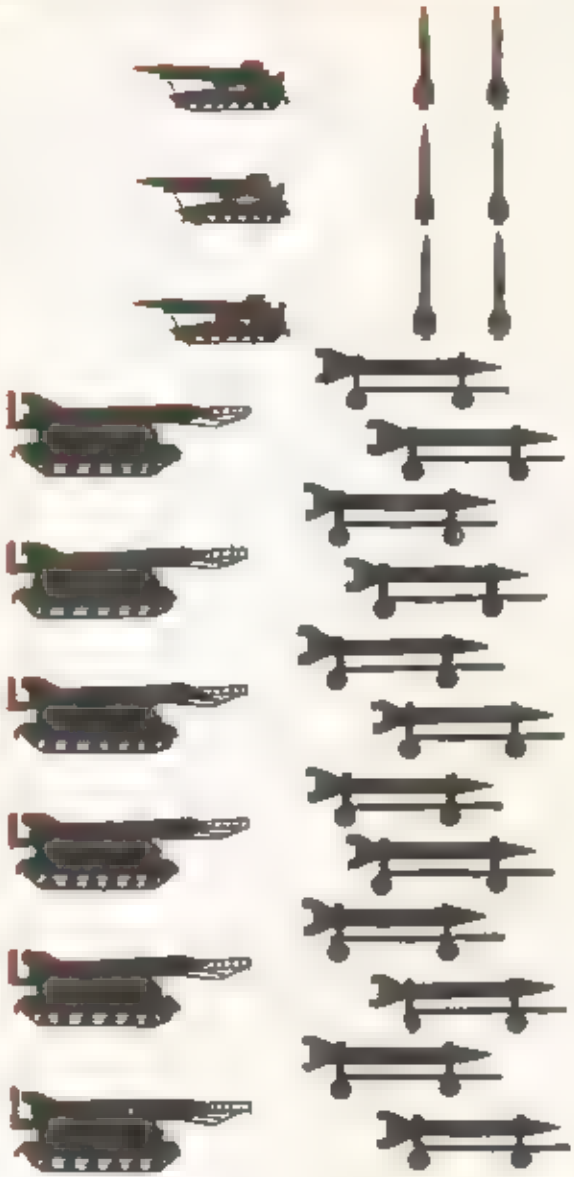
To avoid using SECRET information in this article some figures and data are approximate. This also applies to '51' SHOCK ARMY which represents the organisation of an average SOVIET ARMY. This article gives an accurate picture of SOVIET capabilities but for planning purposes information given in SECRET documents should be used.


FEBA
90 km
RESTD
TANK DIV
TANK DIV
TANK DIV
FROG Bn
FROG Bn
FROG Bn
ARMY SCUD BRIGADE
MOTOR RIFLE DIV
TANK DIV
FROG Bn
FROG Bn
FRONT MISSILES

51 SHOCK ARMY's TACTICAL MISSILES

Each Division has its own FROG Rocket Battalion of three FROG launchers and reserve missiles.

51 Shock Army has its own SCUD Brigade of six SCUD launchers and reserve missiles.



It will have allocated by the FRONT Commander extra Front missiles as he sees fit.....

.....to give a Total of

FROGS

15 LAUNCHERS

45 MISSILES

SCUDS

6 LAUNCHERS

18 MISSILES

FRONT

3+ MISSILES

FROGS

The FROGS will be the older tracked versions

FROG 3

or

FROG 4

or the latest weapon.....

FROG 7

..... which is mounted on a wheeled launcher and is a greatly improved version. It has been introduced recently and is replacing the Tracked FROGS in the Warsaw Pact countries.

SCUDS

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The SCUDS will be

SCUD A or SCUD B

These are carried on

the tracked TEL

(Transporter Erector Launcher)

or

on the latest TEL•••••

····· SCUD B Wheeled TEL

This is the latest SCUD TEL. It is entering service and may be capable of launching an improved SCUD missile

As well as these, the FRONT COMMANDER can allocate to 51 SHOCK ARMY whatever extra missiles are needed for the task.

These could be either :—

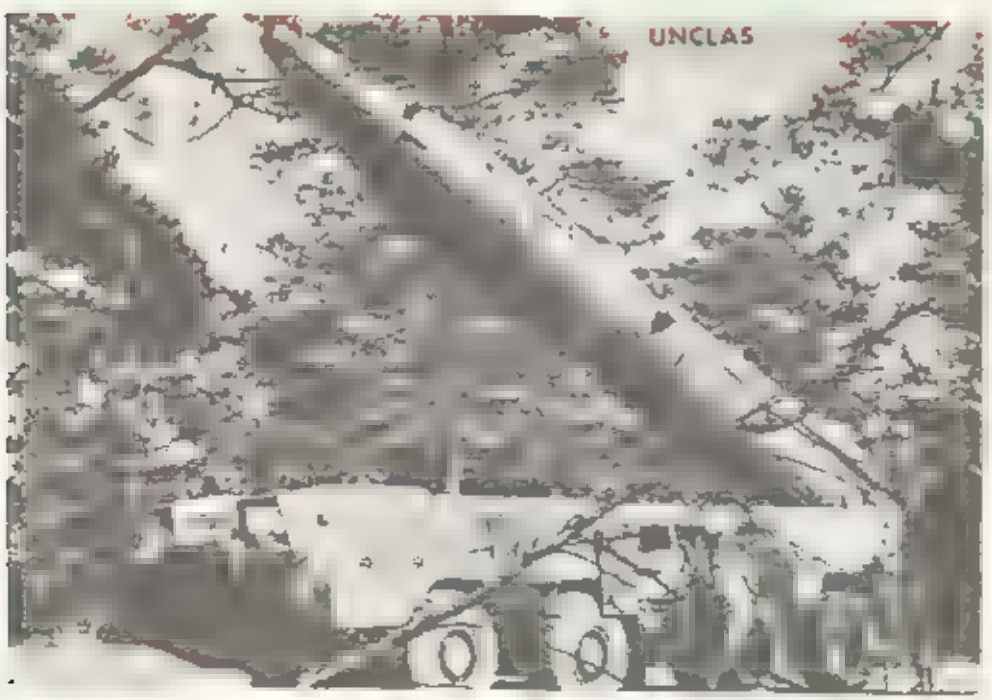
More SCUDS

or ....

FRONT CRUISE MISSILES

which are winged aerodynamic missiles of great accuracy. They are often carried in huge tubes like SHADDOCK

OR the "FRONT" COMMANDER may even be able to allocate some of the latest mobile long range weapons launched from the SCALEBOARD TEL



SOVIET ARMY MISSILES

System Operation and Performance

PART 1

Tracked FROGS

and

Tracked SCUDS

TRACKED FROGS
(FROG 3, 4, and 5)

DATA

Missile length... 35 feet
weight... 2 tons
Range..... About 50 Km (depending on Warhead)
Warhead types.. H E, Chemical, Nuclear and Training

FROG's Tracked Chassis makes it fast across country.....

.....and it can deploy on almost any type of ground.....

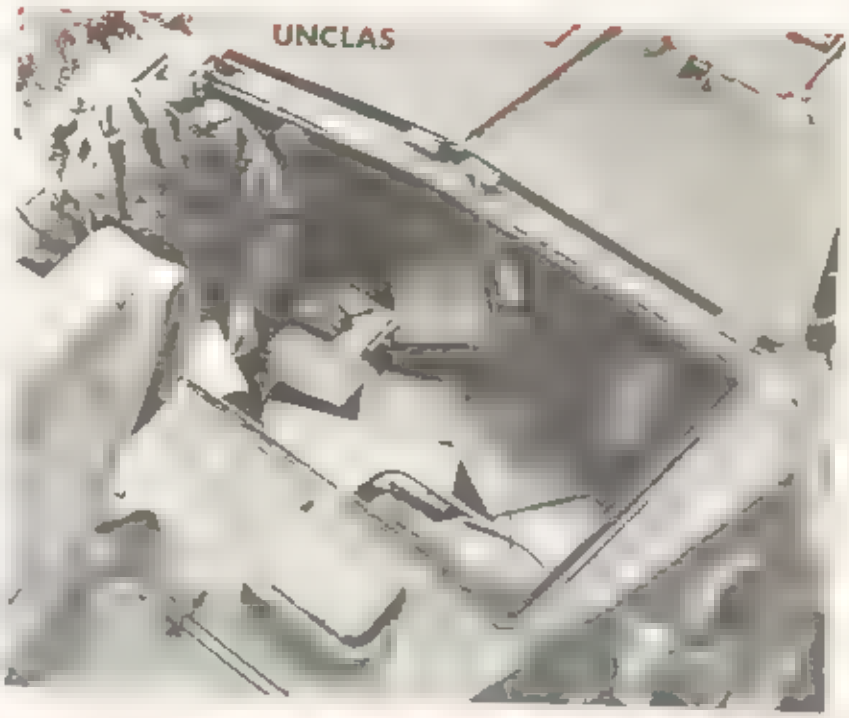
.....but it suffers from the usual tank problem of limited track life.

To save its tracks FROG often travels on a TANK TRANSPORTER until committed to battle.

FROG fires from un-prepared sites which are recce'd & surveyed shortly before it arrives.

When the Launcher arrives it is prepared for action.

WHEN A TARGET IS ORDERED THE BEARING & RANGE ARE CALCULATED IN THE LAUNCHER COMMAND POST

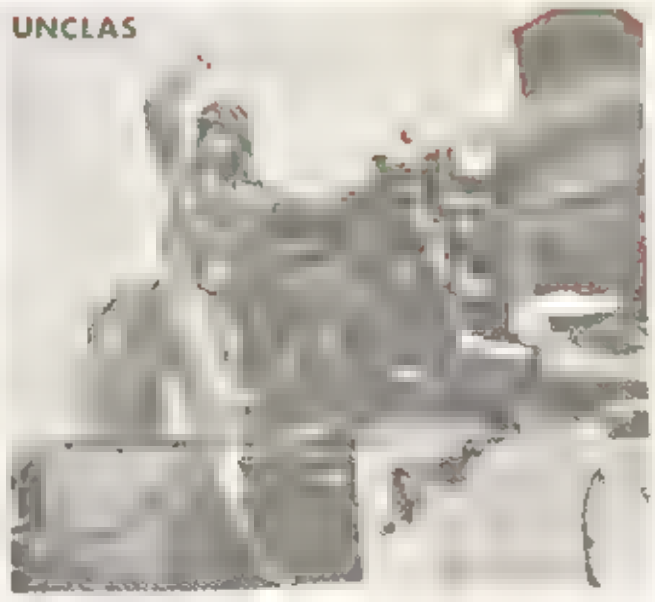


THE DIRECTION & SPEED OF GROUND WIND IS DECIDED

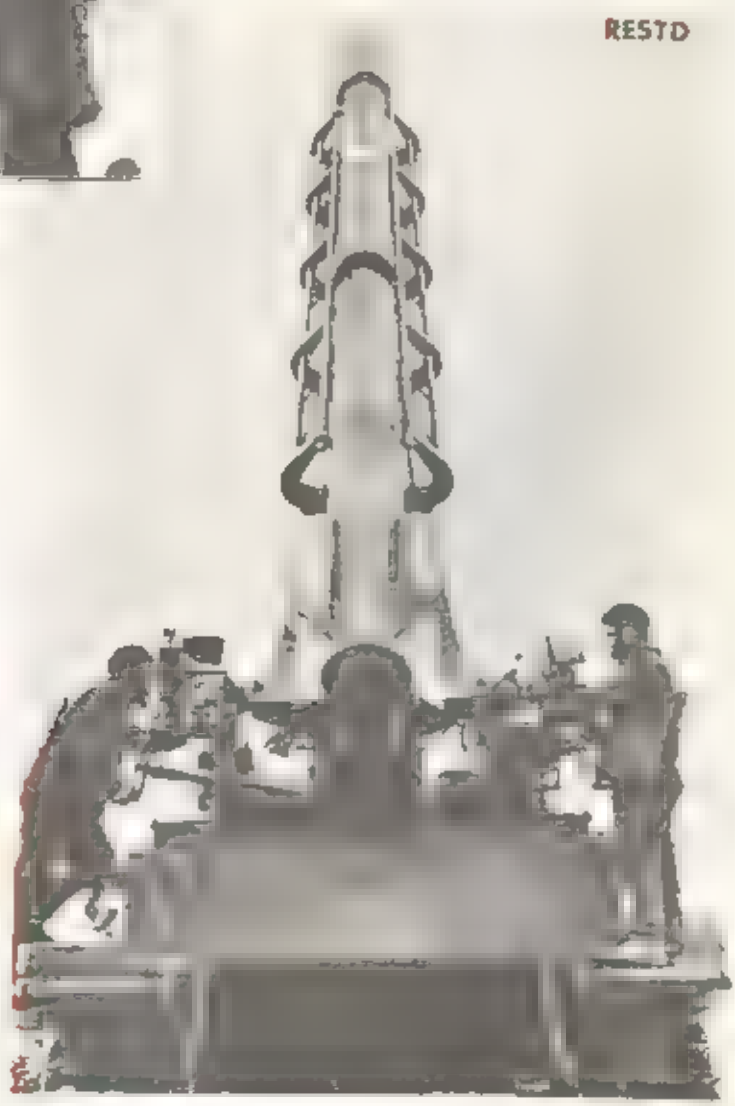
THE NECESSARY DATA

IS

PASSED TO THE LAUNCHER



THE FUZE IS SET



THE LAUNCHER LAID ···

.....The settings are checked by the commander, the detachment runs to the remote firing panel.....

.....and the Rocket is launched.

This has all taken about thirty minutes. →

..... After firing, the launcher drives to a preselected position.....

UNCLAS

.....where its next missile is already prepared on its trailer.....

A CRANE IS USED TO LOAD A NEW MISSILE

THE DETACHMENT THEN GOES TO A POSITION OF CONCEALMENT TO AWAIT THE NEXT TARGET. IF THEY HAVE PASSED THROUGH A CONTAMINATED AREA THEN THEY WILL CARRY OUT DECONTAMINATION

TRACKED SCUDS (Scud A & Scud B)

DATA

Missile length...38 Feet

weight...7 Tons

Range.....About 250 Km for SCUD 'B'
(less for the older SCUD A)

Warhead Types..HE, Chemical, Nuclear and Training

Like FROG it has good mobility and cross country performance. Again like the tracked FROGS track life can be a problem. SO.....

the loaded TEL is carried for long hauls where possible on wheeled transporters until required to deploy.

SCUD fires from unprepared sites which have been recce'd and surveyed shortly before it arrives. The Missile will have been fuelled and checked out before it reaches the launching site.

.....When a target is ordered the missile is elevated and oriented using a theodolite and sight on the missile.

A simple form of inertial guidance is programmed from the firing data.

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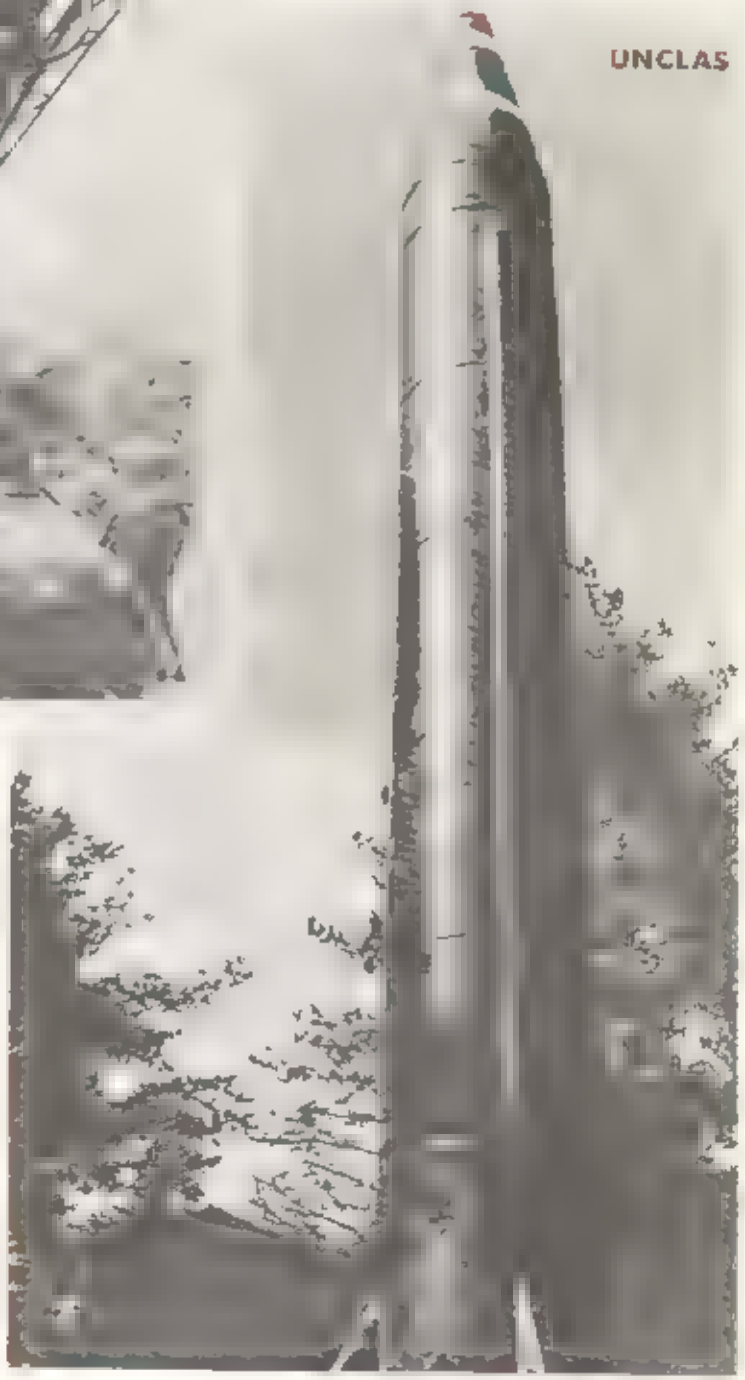
Warhead fuse settings are made from target data.

UNCLAS



The cradle is Lowered

The order to fire is given .....

....and the missile lifts off on its way to the distant target.

Meanwhile, at a re-supply point, a new missile has been prepared. A motor has been fuelled, the correct warhead mated to it and the complete missile tested. It is placed on a re-supply trailer to await the launcher.

The empty launcher arrives and the missile is transferred to it.

SCUD is now ready to engage its next target and drives to its new launcher position.

7. SOVIET ARMY EQUIPMENT QUIZ

HOW GOOD IS YOUR GENERAL KNOWLEDGE OF THE SOVIET ARMY AND ITS EQUIPMENT?

Another group of pictures of the Soviet Army to set you thinking again

It is hoped that they have been both useful and entertaining. When extracted from the REVIEW the classification of these pages will remain RESTRICTED

You should first identify and give the nomenclature of the equipments illustrated and then consider in which Soviet units or formations you would expect them to be used. The answers will be found on page 54.

Grading Guide

Six correct answers	-	Excellent, or you cheated
Five correct answers	-	Very good
Four correct answers	-	Good
Three correct answers	-	Fair

Below three correct answers - Poor; try next issue.

1. He will have to watch his backswing - but you watch the equipment. Name please.

2. Bridge that gap with - What?

3. A familiar vehicle these days. Do you know it?

4. Name this equipment and its function.

5. A down-to-earth vehicle! Give its name and use.

6. Hardly the time of year for this equipment - What is it?

ANSWERS

1. PT 76 amphibious tank.

2. KMM truck mounted bridging. Each section is 7 metres in length and a complete unit will have five sections.

3. BTR 60 p. The standard APC of the Soviet Army.

4 MTU. Tank mounted bridge layer on a T 54 chassis with a span of 39 ft.

5 ASU 85. Mounting an 85 mm gun this 14 ton equipment is in service as an airborne assault gun. Based on a modified PT 76 light tank chassis it is not, however amphibious.

6 Frog 7. Free Rockets Over Ground are found with the divisional artillery in Soviet army organizations.

8. MILITARY UNIFORMS AND INSIGNIA

Czechoslovakia

This is the first of a series of articles based in the main on US Defence Intelligence Agency material, depicting the uniforms and insignia of the Warsaw Pact ground forces. A knowledge of uniforms, insignia and decorations can be an asset in Technical Intelligence as identification of the corps or unit to which equipment belongs can often be made from the insignia worn by the operator. Much of the Warsaw Pact equipment, although similar in appearance, can be identified by the uniforms of the troops associated with it. During future issues of the RESTRICTED version of the Review, the different insignia of Warsaw Pact countries will be presented to increase your knowledge and to make identification easier.

CZECHOSLOVAKIA GROUND FORCES

Uniforms

Up until 1959, Czechoslovakian uniforms were influenced by the USSR, but today they are distinctly Czechoslovakian. All uniforms are made of olive-drab khaki cloth with sewn-on shoulderboards. The field service uniform is that most commonly worn by officers being identified by the Sam Browne style belt. Both officers and other ranks have dress uniforms.

Armoured troops are identified by their black beret or crash helmet which are worn in the field. All units have camouflage uniforms which have a hood and are normally worn over field uniforms. Rank badges on camouflage uniforms are worn above the right breast pocket. Parachute troops are issued with special boots and leather jump helmets.

Insignia

The national insignia is worn on headgear and belt buckles. Badges of rank are worn on shoulderboards with grades indicated by varying the number and size of stars. Distinctive branch insignia of metal are worn by both officers and men with combat arms being easily identified by gold insignia with other arms wearing silver. Branch insignia are worn on the shoulderboards by generals and on the coat collars by all other officers and other ranks.

Ribbons representing decorations and medals are worn by members of the armed forces on all uniforms except work and fatigue.

CZECH UNIFORMS AND INSIGNIA

RESTD

OFFICERS

SERVICE-FIELD
ALL RANKS

OVERCOAT
ALL RANKS

STEEL

TANK

PILPA

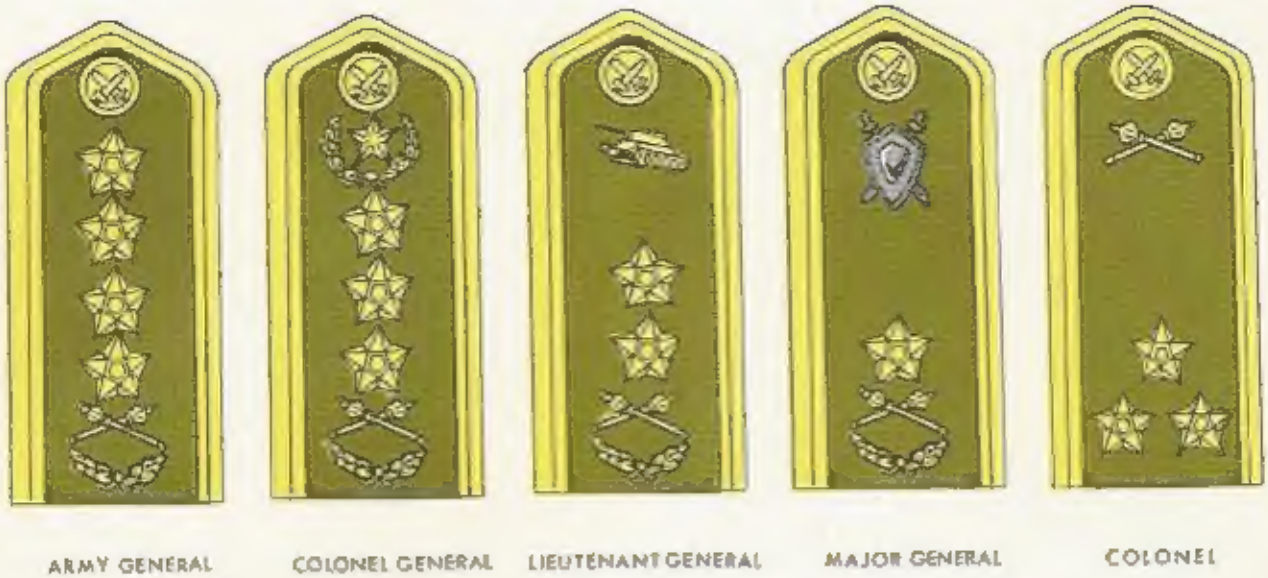
CAMOUFLAGE
ALL RANKS

BUTTON

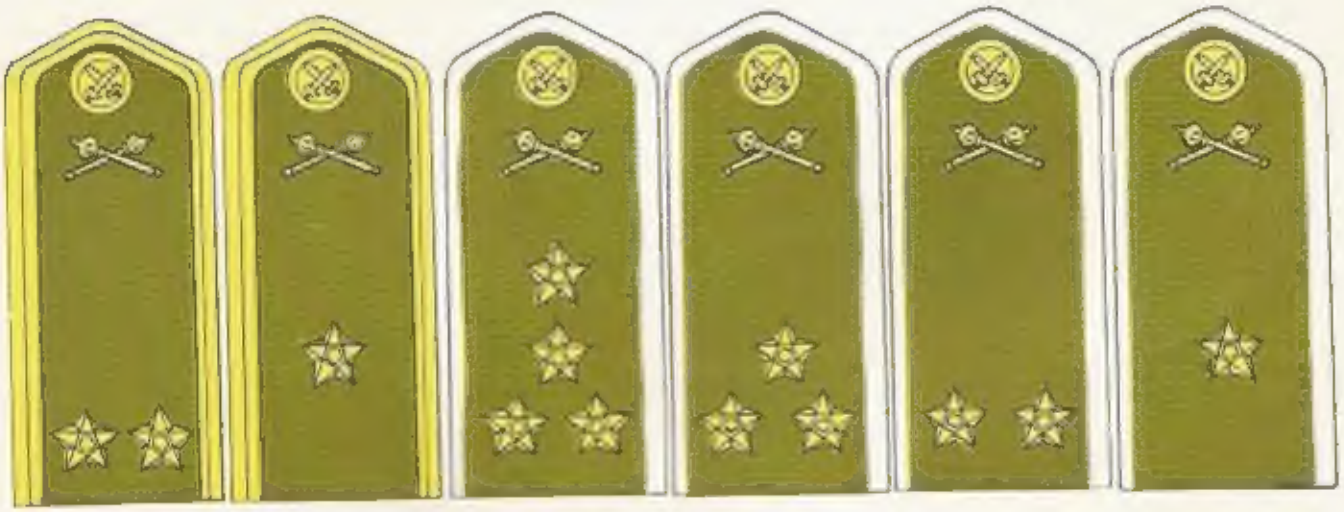
BUCKLE

RESTD

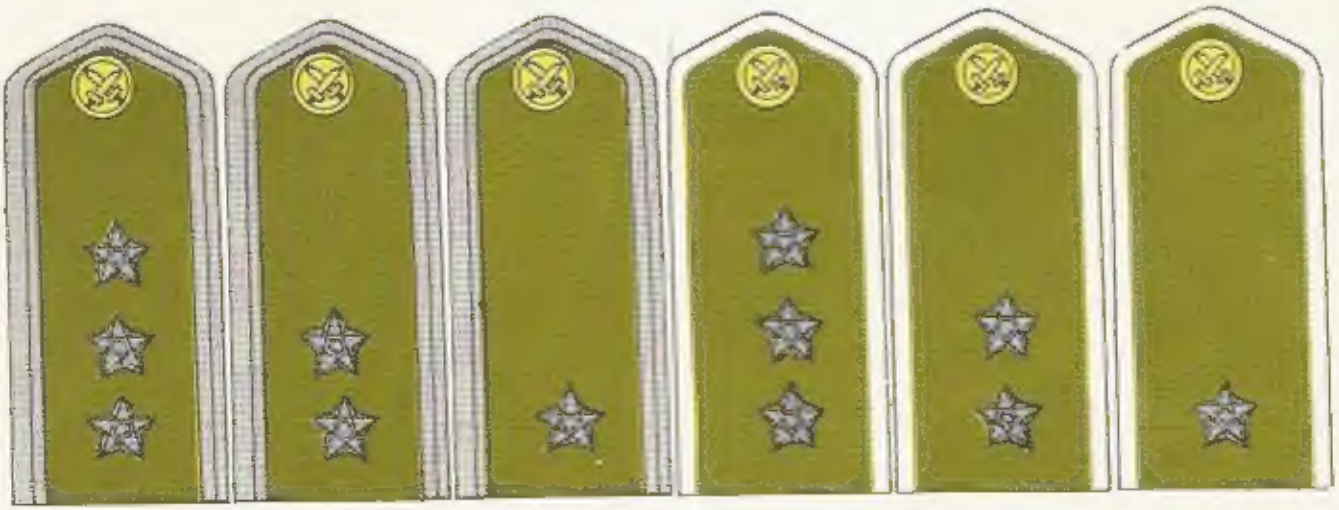
CZECH ARMY SHOULDER BOARDS



ARMY GENERAL | COLONEL GENERAL | LIEUTENANT GENERAL | MAJOR GENERAL | COLONEL



LIEUTENANT COLONEL | MAJOR | CAPTAIN | SENIOR LIEUTENANT | LIEUTENANT | JUNIOR LIEUTENANT



SENIOR CHIEF WARRANT OFFICER | CHIEF WARRANT OFFICER | JUNIOR CHIEF WARRANT OFFICER | SENIOR WARRANT OFFICER | WARRANT OFFICER | JUNIOR WARRANT OFFICER

RESTD

SHOULDER BOARDS (CONTINUED)

SERGEANT | CORPORAL | PRIVATE 1st CLASS | PRIVATE

RESTD

UNIFORM INSIGNIA